

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/567,817

Examiner: Natasha E. Young

Applicant(s)/Appellant(s): Jeremy Daniel
McKendrick Watson et al.

Art Unit: 1774

Confirmation No.: 4459

Title: PURIFIER

Filed: February 08, 2006

Atty. Docket No.: M01B128

Commissioner for Patents
MAIL STOP ****APPEAL BRIEF - PATENTS****
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APPEAL BRIEF

Dear Sir/Madam:

Appellants submit herewith an Appeal Brief in the above-referenced matter under
37 CFR 41.37.

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I. STATEMENT OF THE REAL PARTY IN INTEREST

The real party in interest is Edwards Limited, an English company of Manor Royal Crawley, West Sussex, RH10 9LW, United Kingdom, and is the assignee of record of the subject application.

II. RELATED APPEALS AND INTERFERENCES

Appellants are not aware of any related appeals, judicial proceedings or interferences that may be related to, directly affect, be directly affected by, or have a bearing on the Board's decision on this appeal.

III. STATUS OF CLAIMS

Claims 1 and 3-23 are pending in the application. Claim 2 is cancelled. Claims 1 and 3-23 stand rejected by the Examiner, and are the claims on appeal.

IV. STATUS OF AMENDMENTS

No amendment has been filed subsequent to the Final Office Action dated February 23, 2010.

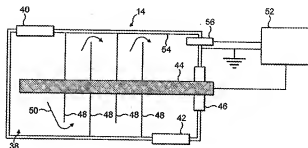
V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention is directed to a purifier used in a gas processing application for removing impurities or contaminants from a gas stream. For example, as shown in FIG. 3 of the application, purifier 14 is constructed by an electrode 44 made of getter material, along which baffle plates 48 are arranged. *See, page 7, lines 11-21.* In use,

power supply 52 generates an electric arc between the electrode 44 and the inner wall 54

of chamber 38. *See, page 7, lines 23-24.* This results in arc evaporation of the getter material from the electrode 44, which forms a coating of getter material on the surfaces of the baffle plates 48. *See, page 7, lines 23-27.* Once deposition of the electrode material is complete, the gas to be

purified is passed through the chamber 38. *See, page 7, lines 27-29.* As the gas passes over the coated baffle plates 48, contaminants are removed by



their reaction with the getter material. *See, page 7, lines 29-32.* The invention is particularly advantageous in that it permits the generation of a fresh film of active getter material in situ. *See, page 4, lines 20-21.* This avoids the need for interrupting the manufacturing process to take a spent purifier off-line for regeneration or replacement of the active getter material as is necessary with purifiers known from the prior art. *See, page 4, lines 21-24.*

Independent claim 1 is directed to a purifier for use in a gas processing application comprising: a chamber (*e.g.*, FIG. 3, number 38) having a gas inlet (*e.g.*, FIG. 3, number 40) and a gas outlet (*e.g.*, FIG. 3, number 42); at least one baffle (*e.g.*, FIG. 3, number 48) arranged in the chamber and having a coating comprising a getter material to react with species to be removed from a gas stream and form stable compounds (*e.g.*, *page 7, lines 25-30*); a source of the getter material (*e.g.*, FIG. 3, number 44) within the chamber; and means for vaporizing the source of the getter material to refresh the coating

of getter material on the at least one baffle (*e.g.*, FIG. 3, electrode 44, the inner wall of chamber 38, and power supply 52; page 7, lines 23-27 and page 8, lines 1-8).

Independent claim 16 is directed to a semiconductor processing system comprising: a process chamber (*e.g.*, FIG. 1, number 10) having a purified gas inlet (*e.g.*, FIG. 1, number 12); and a purifier (*e.g.*, FIG. 1, number 14) comprising: a housing (*e.g.*, FIG. 3, the walls forming the chamber 38); a gas inlet (*e.g.*, FIG. 3, number 40); a gas outlet (*e.g.*, FIG. 3, number 42) upstream of the purified gas inlet; at least one baffle (*e.g.*, FIG. 3, number 48) arranged within the housing and comprising a getter material *e.g.*, page 7, lines 25-30); a source of the getter material (*e.g.*, FIG. 3, number 44); and means for applying an electric potential across the source of the getter material and the housing, thereby vaporizing the source of the getter material to refresh the coating of getter material on the at least one baffle (*e.g.*, FIG. 3, electrode 44, the inner wall of chamber 38, and power supply 52; page 7, lines 23-27 and page 8, lines 1-8).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- A. Whether Examiner errs in rejecting claims 1, 14, and 15 under 35 USC 103(a) as being unpatentable over US Patent No. 4,942,019 to Goodell et al. (hereinafter referred to as “Goodell”) in view of U.S. Patent No. 4,137,012 to della Porta et al. (hereinafter referred to as “Porta I”) and U.S. Patent Application Publication No. 2002/0051712 to Deninger et al. (hereinafter referred to as “Deninger”).
- B. Whether Examiner errs in rejecting claims 6-9 under 35 USC 103(a) as being unpatentable over Goodell in view of Porta I, Deninger, and US

Patent No. 3,620,645 to della Porta et al. (hereinafter referred to as “Porta II”).

- C. Whether Examiner errs in rejecting claims 3-5 under 35 USC 103(a) as being unpatentable over Goodell in view of Porta I, Deninger, Porta II, and US Patent No. 3,399,052 to Bobo (hereinafter referred to as “Bobo”).
- D. Whether Examiner errs in rejecting claims 10-12 under 35 USC 103(a) as being unpatentable over Goodell, Porta I, Deninger, Porta II, and US Patent No. 3,167,678 to Griessel (hereinafter referred to as “Griessel”).
- E. Whether Examiner errs in rejecting claim 13 under 35 USC 103(a) as being unpatentable over Goodell in view of Porta I, Deninger, and US Patent to No. 3,593,495 to Ellison (hereinafter referred to as “Ellison”).
- F. Whether Examiner errs in rejecting claims 16, 20, 21, and 23 under 35 USC 103(a) as being unpatentable over US Patent No. 5,911,560 to Krueger et al. (hereinafter referred to as “Krueger”) in view of Goodell, Porta I, and Deninger.
- G. Whether Examiner errs in rejecting claims 17-18 under 35 USC 103(a) as being unpatentable over Krueger in view of Goodell, Porta I, Deninger, and Porta II.
- H. Whether Examiner errs in rejecting claim 19 under 35 USC 103(a) as being unpatentable over Krueger in view of Goodell, Porta I, Deninger, and Ellison.

- I. Whether Examiner errs in rejecting claim 22 under 35 USC 103(a) as being unpatentable over Krueger in view of Goodell, Porta I, Deninger and Griessel.

VII. ARGUMENT

A. Examiner errs in rejecting claims 1, 14, and 15 under 35 USC 103(a) as being unpatentable over Goodell in view of Porta I, and Deninger.

1. Neither Goodell nor Porta I teaches the limitation, “means for vaporizing the source of the getter material to refresh the coating of getter material on the at least one baffle,” of claim 1.

Examiner acknowledges “Goodell does not disclose... means for vaporizing the source of the getter material to refresh the coating of getter material on the at least one baffle.” *See, the Final Office Action, page 3, lines 9-13.* Porta I does not teach the claimed limitation, either. Porta I teaches a getter pump having pleated strips of substrate embedded therein a **non-evaporable** getter material. *See, col. 2, lines 15-17.* “In the broadest aspect of the present invention [Porta I], any **non-evaporable** getter material can be employed, such as titanium, zirconium, tantalum, or niobium, as well as alloys and/or mixtures of two or more of the above or with other materials that do not materially reduce their sportive capacity.” *See, col. 2, lines 48-53.*

2. It would not have been obvious for a person skilled in the art to modify Goodell and Porta I by replacing their respective non-evaporable getter design with the evaporable getter design of Deninger.

“Deninger et al discloses the use of fresh and extremely pure metallic getter surface can be produced by evaporation or cathode sputtering in a vacuum...,” Examiner asserts. “Because these two elements types of getter material (evaporative and non-evaporative) were art recognized equivalents at the time the invention was made, one or ordinary skill in the art would have found it obvious to substitute evaporative getter for non-evaporative getter.” *See, the Final Office Action, page 4, lines 11-19.* However, Appellants respectfully disagree with the assertion.

As shown in FIG. 2 of Goodell, it discloses a gas purifier where the gas to be purified enters the chamber C via filter 20, moves around baffle plates 24, and leaves the chamber C via filter 21. *See, col. 3, lines 41-45.* A heater 16 is inserted into chamber C in order to increase the

temperature in the chamber to about 450 degrees Celsius.

See, col. 3, lines 38-41.

While traversing chamber C, the gas to be purified intimately contacts with getter granules 25, thereby stripping impurities from it.

See, col. 3, lines 45-47.

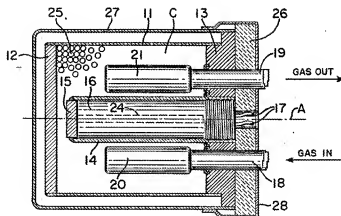


FIG. 2

The objective of Goodell is to provide a gas purifier that is substantially smaller, more easily maintained, and less expensive to manufacture than the prior art system. *See, col. 1, lines 49-52.* As shown in FIG. 2 of Goodell, the major components of the purifier

are fitted to the base plate 13, which facilitates component alignment as well as ease of assembly for overall reduced production costs. *See, col. 3, lines 26-30.* The getter granules 25 can be loaded into the purifier via the large opening formed by the top cap 12. *See, col. 3, lines 32-34.* This assembly provides a wide range for the size of material that can be loaded, and facilitates internal cleaning and reloading of the device. *See, col. 3, lines 34-37.*

Goodell teaches away from replacing the heater 16 with a vaporization device, because such modification would lead to a more complex and expensive purifier. For example, if Goodell were to be modified, the heater 16 would need to be replaced with an electric arc generator in order to vaporize the getter granules 25. This would lead to a more complex and expensive purifier, due to the additional parts and likely higher power requirement. Furthermore, due to the loose and mobile nature of the getter granules 25, it would be difficult for the electric arc to accurately target them in order to vaporize the getter material. If the getter granules 25 were to be replaced with a getter material fixed to the inner wall of chamber C in accommodation of the electric arc generator, the advantage of easy loading of getter granules 25 touted by Goodell would be lost. In addition, if vaporized getter material were to be produced in chamber C, additional sealing would be needed in order to prevent it from leaking out of the chamber. Since Goodell aims to provide a compact, simple, and inexpensive purifier, it teaches away from a purifier based on getter vaporization technology.

It is improper to combine references where the references teach away from their combination. *In re Grasselli* 713 F.2d 731, 743 (Fed. Cir. 1983). For the reasons discussed, Appellants respectfully submit that it is improper to combine Goodell and

Deninger by replacing Goodell's heater 18 with a vaporization device in view of

Deninger.

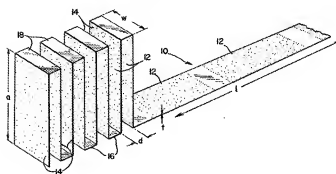
Porta I teaches a getter pump having a pleated strip 10 embedded with non-evaporable getter material 12, as shown in FIG. 1. *See, col. 3, lines 37-43.* In operation, electric current is passed through the strip 10 to increase the temperature of getter material 12 to a range between

600 degrees Celsius and 900

Celsius for a few hours, such that the getter material 12 is activated to absorb impurities from the gas to be purified. *See, col. 4, lines*

16-38.

FIG. 1



The objective of Porta I is to provide a getter pump, which required no separate heater, thus reducing the power requirements and costs of the pump. *See, col. 1, lines 64-67.* The objective is satisfied by connecting two ends of the strip 10 made of resistive material to their respective electrodes, such that the strip 10 can function as a heater. *See, col. 2, lines 8-12.* The strip 10 embedded with non-evaporable getter material is pleated to provide better absorption performance. *See, col. 2, lines 17-31.* An important characteristic of the getter pump is the ratio of the distance between parallel zones of the substrate, d , and the width, w , the ratio being d/w . *See, col. 6, lines 14-17.* The largest pumping speeds are obtained when the ratio d/w is between $1/60$ and $1/6$. *See, col. 6, lines 32-35.*

Prota I teaches away from utilizing a vaporization-based design as taught by Deninger. Vaporizing getter material would likely consume more power than heating non-evaporable getter material, and therefore goes against Porta I's objective, i.e., reducing the power requirements and costs of the pump. Moreover, vaporized getter material can deposit on the strip 10 and change the d/w ratio over time. As the deposit thickens, this can compromise the performance of getter pump.

It is improper to combine references where the references teach away from their combination. *In re Grasselli* 713 F.2d 731, 743 (Fed. Cir. 1983). For the reasons discussed, Appellants respectfully submit that it is improper to combine Prota I and Deninger by adding a getter vaporization mechanism to Prota I in view of Deninger.

3. *Claims 1, 14, and 15 are patentable under 35 USC 103(a) over Goodell in view of Porta I and Deninger.*

For the reasons discussed above, Appellants respectfully submit that claim 1 is patentable over Goodell in view of Porta I and Deninger under 35 USC 103(a). Claims 14 and 15 depend from claim 1 and include all the limitations recited therein. Thus, claims 14 and 15 are also patentable over Goodell in view of Porta I and Deninger under 35 USC 103(a).

B. Examiner errs in rejecting claims 6-9 under 35 USC 103(a) as being unpatentable over Goodell in view of Porta I, Deninger and Porta II.

As discussed above, Appellants respectfully submit that claim 1 is patentable over Goodell in view of Porta I and Deninger under 35 USC 103(a). Claims 6-9 depend from claim 1 and include all the limitations recited therein. Thus, claims 6-9 are also patentable over Goodell in view of Porta I, Deninger and Porta II under 35 USC 103(a).

C. Examiner errs in rejecting claims 3-5 under 35 USC 103(a) as being

unpatentable over Goodell in view of Porta I, Deninger, Porta II, and Bobo.

As discussed above, Appellants respectfully submit that claim 1 is patentable over Goodell in view of Porta I and Deninger under 35 USC 103(a). Claims 3-5 depend from claim 1 and include all the limitations recited therein. Thus, claims 3-5 are also patentable over Goodell in view of Porta I, Deninger, Porta II and Bobo under 35 USC 103(a).

D. Examiner errs in rejecting claims 10-12 under 35 USC 103(a) as being

unpatentable over Goodell, Porta I, Deninger, Porta II, and Griessel.

As discussed above, Appellants respectfully submit that claim 1 is patentable over Goodell in view of Porta I and Deninger under 35 USC 103(a). Claims 10-12 depend from claim 1 and include all the limitations recited therein. Thus, claims 3-5 are also patentable over Goodell in view of Porta I, Deninger, Porta II and Griessel under 35 USC 103(a).

E. Examiner errs in rejecting claim 13 under 35 USC 103(a) as being

unpatentable over Goodell in view of Porta I, Deninger, and Ellison.

As discussed above, Appellants respectfully submit that claim 1 is patentable over Goodell in view of Porta I and Deninger under 35 USC 103(a). Claim 13 depends from claim 1 and includes all the limitations recited therein. Thus, claim 13 is also patentable over Goodell in view of Porta I, Deninger, and Ellison under 35 USC 103(a).

F. Examiner errs in rejecting claims 16, 20, 21, and 23 under 35 USC 103(a) as

being unpatentable over Krueger in view of Goodell, Porta I, and Deninger.

Independent claim 16 includes limitation “*means for applying an electric potential across the source of the getter material and the housing, thereby vaporizing the source of the getter material to refresh the coating of getter material on the at least one baffle.*” It is noted that Krueger is cited for its general disclosure of a semiconductor system, and is not relied on by Examiner for the teachings of vaporization of getter material. *See, the Final Office Action, page 10, lines 1-10.* For the reasons discussed above, Appellants respectfully submit that claim 16 is patentable over Krueger in view of Goodell, Porta I, and Deninger under 35 USC 103(a). Claims 20, 21, and 23 depend from claim 16 and includes all the limitations recited therein. Thus, claims 20, 21, and 23 are also patentable over Krueger in view of Goodell, Porta I, and Deninger under 35 USC 103(a).

G. Examiner errs in rejecting claims 17-18 under 35 USC 103(a) as being unpatentable over Krueger in view of Goodell, Porta I, Deninger, and Porta II.

As discussed above, Appellants respectfully submit that claim 16 is patentable over Krueger in view of Goodell, Porta I, and Deninger under 35 USC 103(a). Claims 17-18 depend from claim 16 and includes all the limitations recited therein. Thus, claims 17-18 are also patentable over Krueger in view of Goodell, Porta I, Deninger, and Porta II under 35 USC 103(a).

H. Examiner errs in rejecting claim 19 under 35 USC 103(a) as being unpatentable over Krueger in view of Goodell, Porta I, Deninger, and Ellison.

As discussed above, Appellants respectfully submit that claim 16 is patentable over Krueger in view of Goodell, Porta I, and Deninger under 35 USC 103(a). Claim 19 depends from claim 16 and includes all the limitations recited therein. Thus, claim 19 is

also patentable over Krueger in view of Goodell, Porta I, Deninger, and Ellison under 35

USC 103(a).

***I. Examiner errs in rejecting claim 22 under 35 USC 103(a) as being
unpatentable over Krueger in view of Goodell, Porta I, Deninger and Griessel.***

As discussed above, Appellants respectfully submit that claim 16 is patentable over Krueger in view of Goodell, Porta I, and Deninger under 35 USC 103(a). Claim 22 depends from claim 16 and includes all the limitations recited therein. Thus, claim 22 is also patentable over Krueger in view of Goodell, Porta I, Deninger, and Griessel under 35 USC 103(a).

Appellants respectfully submit that the Examiner is incorrect in rejecting the pending claims, and that all the pending claims are drawn to a novel subject matter, patentably distinguishable over the prior art of record. Accordingly, Appellants respectfully request that the Appeal be granted and the Examiner reversed.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. (Previously Presented) A purifier for use in a gas processing application comprising:
 - a chamber having a gas inlet and a gas outlet;
 - at least one baffle arranged in the chamber and having a coating comprising a getter material to react with species to be removed from a gas stream and form stable compounds;
 - a source of the getter material within the chamber; and
 - means for vaporizing the source of the getter material to refresh the coating of getter material on the at least one baffle.
2. (Canceled)
3. (Previously Presented) The purifier according to Claim 1 further comprising a collector wherein the means for vaporizing the source of the getter material is arranged to produce an electric arc between the source of the getter material and the collector.
4. (Previously Presented) The purifier according to Claim 3 wherein the collector extends about the source of the getter material.
5. (Previously Presented) The purifier according to Claim 3 further comprising an inner wall of the chamber wherein the collector comprises at least part of the inner wall of the chamber.

6. (Previously Presented) The purifier according to Claim 1 wherein the source of the getter material comprises a rod, the at least one baffle being arranged about the rod.

7. (Previously Presented) The purifier according to Claim 6 wherein the rod extends longitudinally through the chamber.

8. (Previously Presented) The purifier according to Claim 7 wherein the rod is substantially co-axial with the chamber.

9. (Previously Presented) The purifier according to Claim 1 wherein the means for vaporizing the source of the getter material comprises a controller.

10. (Previously Presented) The purifier according to Claim 9 wherein the controller is adapted to activate at predefined time intervals.

11. (Previously Presented) The purifier according to Claim 10 further comprising a sensor for monitoring a process wherein the source of the getter material is vaporized when a predefined change in the process gas is detected by the sensor.

12. (Previously Presented) The purifier according to Claim 11 wherein the sensor is located within the chamber.

13. (Previously Presented) The purifier according to Claim 1 wherein the at least one

baffle is adapted to create a convoluted path for gas flowing through the chamber.

14. (Previously Presented) The purifier according to Claim 1 wherein the getter material comprises at least one metal selected from the group of metals consisting of Ti, Ta and alloys thereof.

15. (Previously Presented) The purifier according to Claim 1 wherein the getter material comprises at least one metal selected from the group of metals consisting of Fe Cr and alloys thereof.

16. (Previously Presented) A semiconductor processing system comprising:

- a process chamber having a purified gas inlet; and

- a purifier comprising:

- a housing;

- a gas inlet;

- a gas outlet upstream of the purified gas inlet;

- at least one baffle arranged within the housing and comprising a getter material;

- a source of the getter material; and

- means for applying an electric potential across the source of the getter material and the housing, thereby vaporizing the source of the getter material to refresh the coating of getter material on the at least one baffle.

17. (Previously Presented) The semiconductor processing system of claim 16 wherein the source of the getter material is a rod.

18. (Previously Presented) The semiconductor processing system of claim 16 wherein the source of the getter material is an electrode.

19. (Previously Presented) The semiconductor processing system of claim 16 wherein the at least one baffle is arranged to form a convoluted flow path.

20. (Previously Presented) The semiconductor processing system of claim 19 wherein at least one baffle is arranged about the source of the getter material.

21. (Previously Presented) The semiconductor processing system of claim 16 wherein the means for applying an electric potential comprises a power supply.

22. (Previously Presented) The semiconductor processing system of claim 16 wherein the means for applying an electric potential comprises a controller for activating the source of the getter material at predefined time intervals.

23. (Previously Presented) The semiconductor processing system of claim 16 wherein the getter material comprises at least one metal selected from the group of metals consisting of Ti, Ta, Zr, Fe, Cr and alloys thereof.

IX. EVIDENCE APPENDIX

Following references are relied upon by the Examiner in rejecting the claims of the present application, and cited in this Appeal Brief. Copies of the references are separately attached to this Appeal Brief.

1. US Patent No. 4,942,019 to Goodell et al. is relied on by Examiner in the Final Office Action of February 23, 2010.
2. U.S. Patent No. 4,137,012 to della Porta et al. is relied on by Examiner in the Final Office Action of February 23, 2010.
3. U.S. Patent Application Publication No. 2002/0051712 to Deninger et al. is relied on by Examiner in the Final Office Action of February 23, 2010.
4. US Patent No. 3,620,645 to della Porta et al. is relied on by Examiner in the Final Office Action of February 23, 2010.
5. US Patent No. 3,399,052 to Bobo is relied on by Examiner in the Final Office Action of February 23, 2010.
6. US Patent No. 3,167,678 to Griessel is relied on by Examiner in the Final Office Action of February 23, 2010.
7. US Patent to No. 3,593,495 to Ellison is relied on by Examiner in the Final Office Action of February 23, 2010.
8. US Patent No. 5,911,560 to Krueger et al. is relied on by Examiner in the Final Office Action of February 23, 2010.

X. RELATED PROCEEDINGS APPENDIX

None